wafer surfaces, and said [amount] concentration of hydrogen peroxide is around 0.1 percent by volume.

Claim 13 (withdrawn)

Claim 14 (currently amended)

14. A cleaning article as in Claim 9 in which said container is a flexible plastic bag.

REMARKS

Claims 1-5, 8-12 and 14 have been amended to correct the terms deemed indefinite by the Examiner, and now are believed to be in proper form.

Furthermore, the claims have been further amended for clarification. It now is made clear that the water-hydrogen peroxide mixture is contained within the cleaning article, regardless of whether it was introduced into the cleaning article before packaging or after.

The rejection of Claim 14 under §102 is believed to be inapplicable now that it has been amended to be dependent from Claim 9, as it was originally intended.

The rejections of the claims as being obvious over Paley '159 alone or in combination with Hymes (5,858,109) are respectfully traversed.

The present invention provides clever and unobvious solutions to significant problems in the supply and use of pre-wetted cleaning articles for cleanrooms, such as

pre-saturated wipers and sponge rollers for cleaning semiconductor wafers.

The wipers are packaged with liquids absorbed in them so that they are ready-to-use with just the right amount of liquid needed for cleaning jobs, etc. This makes them quick and cost-effective to use.

The sponges will dry out if not packaged when wet, and this is very undesirable because they become very hard and often are damaged if they dry out.

Cleaning articles for use in cleanrooms must be very clean. Bacteria in the packages usually are considered to be contaminants. Therefore, it has been the practice in the prior art to package a preservative with the cleaning article to prevent the growth of bacteria.

For example, Bahten 6,076,662, one of the references cited by the Examiner, discloses the use of ammonium hydroxide and certain acids for use as preservatives (Col. 9, lines 13-35).

Certain filters for use in manufacturing semiconductors also must be wet when packaged and should not be allowed to dry out. Such filters also suffer if bacteria is allowed to grow in the packages. Thus, bactericides such as hydrogen peroxide often have been used for this purpose. See: Hopkins et al. 5,928,516 (copy attached)(Col. 1, lines 10-35).

Unfortunately, although the bactericide kills and prevents the growth of bacteria, it also is considered to be a contaminant. Hopkins '516 discusses this problem in Col. 1, lines 50-53.

Hopkins proposes one solution for the problem; namely, to avoid using a preservative or bactericide by instead irradiating with nuclear radiation, ultraviolet light, ozone, heat or ultrasonics, etc. (Col. 5, lines 17-23). The main problem with these solutions is that they are relatively expensive, and some can be less effective or can have adverse side effects.

Hydrogen peroxide has been used as a bactericide or preservative for some time in the past. For example, Hopkins describes the use of 3% hydrogen peroxide (Col. 1, line 49) in the wet packaging of filters. Onodera 6,012,576 (cited by the Examiner) describes storage of scrubbing sponges for semiconductor wafers in a hard-walled container with from 1% to 5% hydrogen peroxide. (Col. 3, lines 8-11.)

The applicant has recognized one way in which hydrogen peroxide can act as a contaminant. That is, over a substantial length of time, hydrogen peroxide can develop significant quantities of metallic ions in the package.

Applicant has solved both of the foregoing problems with a single stroke. He has taken advantage of the fact that

hydrogen peroxide in the present use will decompose into water and oxygen relatively rapidly after being placed in the package, if its concentration is relatively low. At the same time, this also prevents the development of metallic ions in the package so as to prevent contamination by that process.

The inventor has realized that the bactericide need not be present in the package for long in order to do an entirely satisfactory job. This is because the package is sealed after the contents are put into the package, and bacteria are very unlikely to get into the package after it is sealed. Therefore, when the concentration of hydrogen peroxide in the water is set at from 0.05% to 1%, preferably about 0.1%, the hydrogen peroxide kills any bacteria present, and then decomposes into water and oxygen after only a short time, as short as one or two days. Thus, it is virtually certain that the hydrogen peroxide will be gone when the package is opened by the customer, and that the hydrogen peroxide will not have had time to produce any significant quantity of metallic ions.

All of Claims 9-11 and 14 are directed to the product described above.

Paley '159 discloses a package of wipers with a sealed burstable bag inside of an outside bag holding the wipers. The inside bag is burst to wet the wipers just prior to use so as to

minimize contact between the liquid and the wipers in the time between manufacture and use of the wipers.

One of the liquids described in Paley '159 is hydrogen peroxide in water, but the concentration is 35% by volume, a vastly higher concentration than that used in this invention. (Col. 10, lines 32-33.)

Paley '159 does not solve the problems solved by this invention and does not suggest the invention.

The invention gives unexpected results. It reduces the amount of hydrogen peroxide used, thus reducing the cost of materials, while eliminating the possible contamination produced by the hydrogen peroxide.

The contamination elimination has been discussed above, and constitutes a major technological advance.

The cost saving can be significant, even though the reductions in quantity seem modest. This is because "electronics" grade hydrogen peroxide must be used, and it is much more expensive than ordinary hydrogen peroxide.

For the foregoing reasons, Claims 9-11 and 13 are unobvious over Paley '159.

The rejection of Claims 1-8 and 12 over Paley '159 in view of Hymes et al. 5,858,108 is respectfully traversed.

Paley '159 has been discussed above, but it does not discuss anything for scrubbing semiconductor wafers.

Hymes describes the use of "SC1" cleaning liquid with PVA brushes to scrub semiconductor wafers. SC1 is a mixture of water, hydrogen peroxide and ammonium hydroxide (Col. 2, lines 10-12). Typically, the hydrogen peroxide comprises around 4 parts out of 25, or about 16% (Col. 4, lines 6-10), an amount vastly greater than the amounts used in the invention.

Hymes does not deal at all with the problems of packaging and storing wet PVA sponges, and does not suggest the unexpected benefits achieved by the use of the low quantities of hydrogen peroxide in packaging the cleaning articles.

In view of the foregoing, it is respectfully requested that the claims be allowed and the patent application be passed to issue.

Respectfully submitted,

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Enclosure:
Hopkins - 5,928,516